

and venous blood, as perceived through the walls of the vessels, and examines the colour of the arterial blood by opening a small arterial branch near the knee, which he then closes by torsion. During inhalation, he states that a gradual change in hue of arterial blood, as seen through the coats of the arteries to that of the venous blood, may be observed; and when inhalation is carried so far that irritation of the nerves is followed by no muscular contractions, the colour of the arteries and veins is exactly the same, and blood procured from the former has the same dark appearance as that procured from the latter. On suspending the inhalation, the arteries speedily resume their characteristic and distinctive appearance. Large animals, such as dogs, should be employed in this experiment; not frogs, pigeons, or rabbits, whose blood-vessels are too small for the purpose.—*London Med. Gaz.*, Feb. 1848, from *Comptes Rendus*, Dec. 27, 1847.

44. *Physiological Action of Chloroform on Man.*—M. SEDILLOT has observed, that individuals enfeebled by age or disease, and those of temperate habits, are readily affected, and the insensibility is in them persistent. In strong and healthy individuals, and in those habituated to the use of alcoholic drinks, the anæsthesia is slowly produced, and endures for a short period.—*Month. Journ. and Retrospect*, March, 1848.

45. *Action of Chloroform, Ether and Benzin on the Nervous System.*—Dr. SNOW, in a paper read before the Westminster Medical Society, (Jan. 8th.) remarked that the action of chloroform and ether on the nervous system was essentially the same. He divides the effects of ether into five degrees, which may be called degrees of narcotism, instead of etherization, to make the description applicable to other vapours. The immunity from pain did not correspond exactly with the degrees of narcotism of the nervous centres, but was greater as the patient was recovering from the effects of the vapour, than in the corresponding degree, as he was getting under its influence; this was more particularly the case with ether, which he considered had superior anæsthetic effects to chloroform in proportion to the narcotism produced. When ether was inhaled, the patient sometimes completely recovered his mental faculties, whilst the insensibility to the operation continued. This curious phenomenon, he believed had not been explained. He had an hypothesis to offer concerning it to this effect—that it depended on etherization of the nerves of sensation, which continued for some little time, on account of the ether exuding through the coats of the capillaries into the extra vascular lymph of the tissues, and requiring some time to return into the circulation, and escape by the lungs. He had met with this persistence of insensibility to the knife chiefly in young subjects, in whom, connected with the greater activity of nutrition, there was more liquor sanguinis exterior to the vessels. In the brain there was but very little at any period of life. Chloroform probably permeated the coats of the vessels less easily, and he had not met with the symptom in question during its use.

Chloroform certainly possessed the advantage of being less pungent than ether, and was therefore more easily inhaled; it had also one or two other advantages. With respect to its greater rapidity of action, this was not an unalloyed advantage. Ether produced a full surgical degree of insensibility in the adult in four minutes on an average; it might be desirable to shorten this period to two minutes, but not to a shorter time; not only in order to afford opportunity for watching its effects, but also on account of a cumulative property in these vapours, hitherto not alluded to. The effect of them sometimes increased for twenty seconds after the inhalation was discontinued, and he thought it desirable to have six times this period, or two minutes, for producing complete insensibility, in order to avoid danger. But chloroform, when administered on a handkerchief or sponge, as recommended by Dr. Simpson, its introducer, sometimes produced complete insensibility in six or seven inspirations, as that gentleman stated. 100 cubic inches of vapour of chloroform contain 128 grs. of the liquid, a quantity he believed more than sufficient to cause death; and yet this quantity might be contained in 700 or 800 cubic inches of air, and might be all breathed in a quarter of a minute, by taking deep inspirations. Danger might, it was true, be probably avoided, by putting but a limited quantity on the handkerchief or sponge, but this

method was not very applicable in surgical operations, as they could not tell how much would evaporate without being inhaled, and consequently, would be liable to fall short of the effect. When he, Dr. Snow, administered chloroform, he seldom produced complete insensibility in less than two minutes, as he never used the water-bath at a higher temperature than 60°, and if the patient breathed deeply, he opened the valve a little to dilute the vapour still further with external air.

He preferred chloroform on the whole to ether in the cases of adults, and had given it to young children with the most satisfactory results, yet he preferred the less powerful agent in the cases of children, as chloroform acted with still greater rapidity on them than on grown people. Ether rendered children insensible to any operation in the space of two minutes, and its effects on them were extremely favourable; but it required an apparatus by which the vapour could be exhibited very gradually at first, otherwise it caused them to hold their breath, as, indeed, did chloroform. He considered that an anæsthetic agent, which could be safely administered on a sponge or handkerchief by medical men, with no special experience, to all patients, young and old, was still a desideratum. He had lately applied benzin in St. George's Hospital, and its action was very efficient and favourable in four cases of tooth-drawing, where its effects were only carried to the second degree; but in an amputation where narcotism to the third degree was induced, it caused some convulsive tremors, and, consequently, although it totally prevented the pain, and was followed by no ill consequences, yet it did not seem applicable to important operations. The benzin he used was prepared by Mr. Bullock, by distilling benzoic acid with slaked lime. About the same quantity as of chloroform was expended, as about a drachm was used in each of the cases of tooth-drawing, and two drachms in the amputation; but being less volatile, it produced its effects less quickly. Benzin was the same liquid, under another name, as the bicarburet of hydrogen which Dr. Faraday had previously discovered and obtained from condensed oil-gas. It consisted of six atoms carbon and three atoms hydrogen, and had a rather pleasant aromatic odour. He placed on the table an apparatus which he had contrived and used for the administration of chloroform. It consisted of two cylinders placed one within the other, and partially lined with bibulous paper, which absorbed the liquid and gave it up again to the air which passed over its surface. These cylinders were enclosed in a third one containing a water-bath. The inhaler was about the size of a half pint bottle, and when in use was suspended by means of a short tube and screws to the face-piece which formed part of his ether apparatus.—*London Med. Gaz.*, Jan. 1848.

46. *Effects of Chloroform on the Blood.*—Mr. T. B. Toon, who amputated the leg of a patient under the influence of chloroform states, (*Prov. Med. and Surg. Journ.*, Feb. 9th, p. 62,) “one circumstance which particularly arrested my attention during the process of securing the vessels, was the highly venous appearance of the blood issuing from the arteries,” and I further remarked, “that in proportion as the special effect of the chloroform passed off from the patient, the blood from the small muscular branches resumed its arterial character.”

47. *Means of Reviving those Rendered Insensible by Chloroform.*—M. PLOUVIEZ has communicated to the French Academy of Sciences, an account of an experiment on a dog with chloroform. A small dog, weighing about eight pounds, was made to inhale a gramme and a half of chloroform. At the expiration of ten or fifteen seconds the animal was in a state of insensibility. The breathing was soon difficult, and in a short time the animal was dead. The time that elapsed between the exhibition of this dose (about the twentieth of an ounce) and death was a minute and a half. On dissection there was nothing to indicate the cause of death. Dr. Plouviez, in order to ascertain what course could be taken in the event of such an accident occurring to a human patient, made several experiments with various animals, which were ceasing to breathe after the use of chloroform. He introduced air into the lungs in the same way as is done with persons, who have been suffocated by the fumes of charcoal, by stimulating the act of respiration, and from time to time slightly compressing the chest. By adopting this means all the animals speedily resumed their former state. In some cases he even waited until the breathing had entirely ceased, and the animals were apparently